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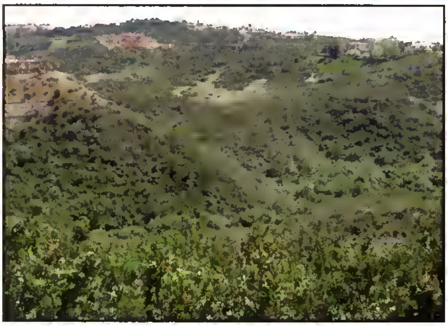

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Top: Buck Gully Reserve as seen from Pelican Hill looking northward along the axis of the Pelican Hill tributary. **Lower left:** Buck Gully looking south toward the Pelican Hill tributary from Canyon Watch Park. Lower right: *Drymarcallis glandulosa* flower.

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VASCULAR PLANTS OF THE BUCK GULLY RESERVE, NEWPORT BEACH, ORANGE COUNTY, CALIFORNIA

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ABSTRACT: Buck Gully is a canyon located within the City of Newport Beach at the western edge of the San Joaquin Hills in Orange County, California. The majority of the natural vegetation and non-developed portions of the canyon are situated within the Buck Gully Reserve, which comprises about 120 hectares (300 acres). Buck Gully Reserve is managed by the City of Newport Beach and the Irvine Ranch Conservancy. It was originally set aside in association with the Newport Coast Planned Community and is an element of the Nature Reserve of Orange County (NROC). The vegetation of the canyon is primarily coastal sage scrub with patches of both non-native and native grasslands and sumac chaparral. I conducted a botanical assessment of the Buck Gully Reserve at the invitation of the Irvine Ranch Conservancy in 2012 and 2013 with a single follow-up visit in 2018. A voucher-based checklist was compiled with a total of 201 vascular plants, including two hybrids, representing 63 families. About 60 percent (120 taxa) were of native origin and about 40 percent (81 taxa) were of non-native origin. The largest families with voucher specimens are Asteraceae (34 taxa), Poaceae (32 taxa), and Fabaceae (nine taxa). Five of the taxa are included within the California Native Plant Society Inventory of Rare and Endangered Plants while another two are considered locally rare.

KEYWORDS: Buck Gully Reserve, coastal sage scrub, Newport Beach, Orange County, vascular plants, San Joaquin Hills, special status plants, rare plants.

INTRODUCTION

Buck Gully is a canyon located within the City of Newport Beach in the San Joaquin Hills of Orange County, California. The canyon historically extended slightly over five kilometers (3.2 miles) from Little Corona Beach at Corona del Mar to Signal Peak, rising from sea level to about 370 meters (1,200 feet). However, in the late 1980s, the upper reaches of the canyon were filled in and the western slopes of Signal Peak were developed as part of the Newport Coast Planned Community. In association with this development, a number of undeveloped canyons between Corona del Mar and Laguna Beach were set aside for purposes of conservation, including the unaltered portions of the canyon located inland of the Pacific Coast Highway.

The Buck Gully Reserve (Reserve) is managed by the City of Newport Beach and the Irvine Ranch Conservancy (IRC) and is an element of the Nature Reserve of Orange County (NROC). The NROC's primary purpose is to contribute to the Central Coastal Natural Communities Conservation Program of Orange County. The Reserve includes about 120 hectares (300 acres) of natural habitat with a public trail system. I was asked by the IRC to conduct a botanical assessment of the reserve in 2012 and 2013 (Roberts 2013). The study area also included natural open space immediately outside the reserve boundary, and these areas have been incorporated in this paper.

The primary focus of the study was to document baseline conditions for rare and sensitive plant species found within the reserve and its immediate environment that are included in the California Native Plant Society online Inventory of Rare and Endangered Species (CNPS Inventory; CNPS 2018) and locally rare plants identified in Roberts (2008). The study resulted in a largely vouchered list of vascular plant species occurring within the reserve and immediately adjacent open space. This information will assist land managers in understanding the Reserve's role as a refuge for naturally occurring plant species that are remnants of a once broader, more contiguous coastal system; for monitoring species diversity in the reserve; and for tracking non-native plant species that are becoming established within the region.

Location

The Buck Gully Reserve is located at the western edge of the San Joaquin Hills and is within the City of Newport Beach, adjacent to the community of Corona Del Mar, Orange County, California (See Figure 1).

The Reserve is largely surrounded by suburban development. On the north, the Reserve is bordered by San Joaquin Hills Road. Newport Coast Road and associated residential communities border the reserve on the east. Pelican Hills Road, the Pelican Hills Resort golf course and associated residential communities border the reserve on the south. Residential communities associated with Sandcastle Drive and Marguarite Avenue border the reserve on the west. The western end of the reserve is roughly marked by Fifth Avenue in Corona Del Mar.

Physical Description

Buck Gully, the canyon, is associated with the western slopes of Signal Peak and the northern slopes of Pelican Hill. The topography of the canyon is dominated by a "V" shaped drainage with relatively steep slopes, especially at the west end. The central north slope and upper portions of the canyon tend to present more gentle slopes and a large tributary canyon dominates the southeastern end of the reserve. This southern tributary is here referred to as the "Pelican Hills

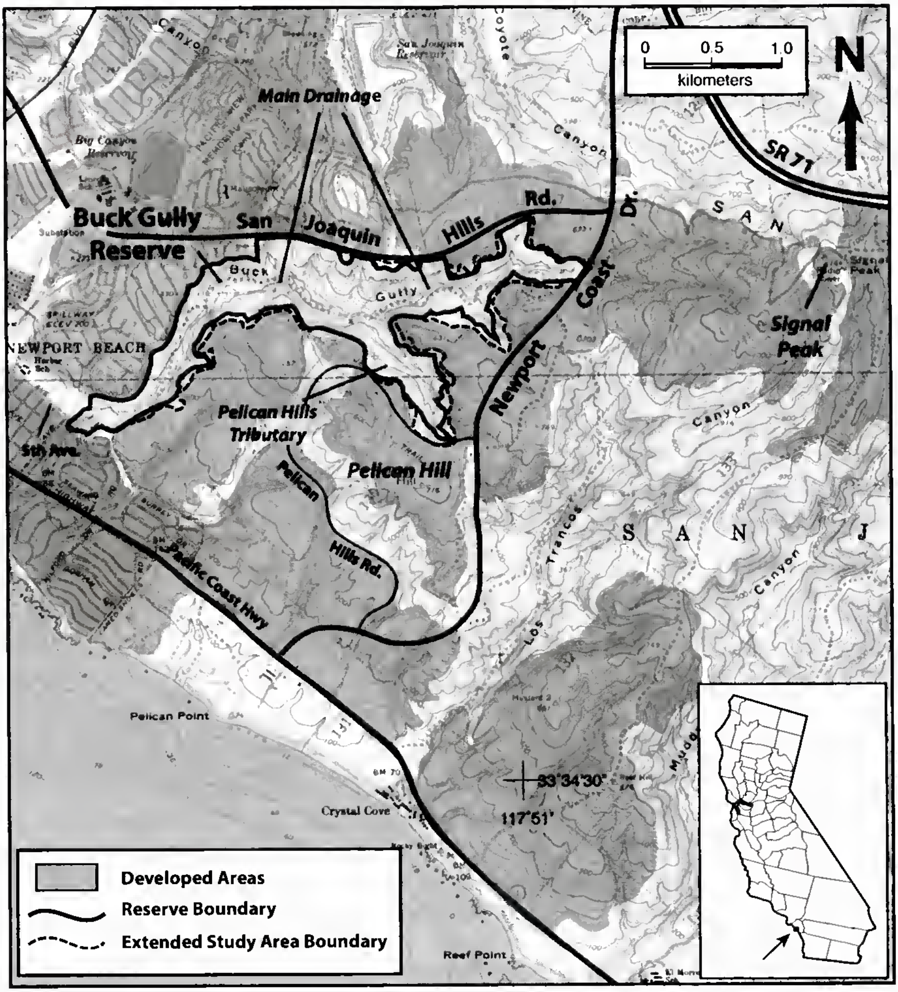

Figure 1: General Location of the Buck Gully Reserve, Newport Beach, San Joaquin Hills, and relationship to surrounding features.

Figure by Fred M. Roberts, Jr. August 2017

tributary". United States Geological Survey maps show both the main drainage and the Pelican Hills tributary as intermittent stream courses. Today, both of these drainages now appear to support a vigorous year-round flow originating as runoff from landscape irrigation in residential areas surrounding the reserve. Elevations within Buck Gully Reserve range from about 30 meters (95 feet) in the west to about 210 meters (700 feet) in the east on the slopes of Signal Peak.

The soils within Buck Gully consist mostly of Calleguas Clay Loam, Anaheim Loam, Balcom Clay Loam, Alo Clay, and a small patch of Cienega-rock Outcrop Complex (USDA 2108). Calleguas Clay Loam, which is found on the south slope of the western third of the canyon and the north slopes and floor of the central and eastern portions, is the most widespread unit. Alo Clay is found primarily on the south slope of the central west area, the tributary north of Pelican Hill, and at the eastward, upper end of the canyon. Pelican Hill itself is underlain by bedrock of the San Onofre formation. This formation appears to extend into the reserve along its southern boundary. Small to scattered patches of heavy clay are often associated with openings in the vegetation.

Climate

The San Joaquin Hills are located in California's Mediterranean climate zone, characterized by warm, dry summers and mild, wet winters. Located on the coastal slopes of the San Joaquin Hills, Buck Gully experiences a strong marine influence, frequent stratus cloud cover, and infrequent frost.

The Buck Gully Reserve is adjacent to Laguna Beach, which has an average temperature of 16.2°C (61.1°F), an average low temperature of 10.6°C (51.0°F), and an average high temperature of 27.8°C (71.2°F). The average rainfall at Laguna Beach is 344 mm (13.55 inches) (Western Regional Climate Center 2018).

METHODS

Field surveys within the Reserve were performed on six days between 6 April and 6 September during 2012 and on two days, 11 April and 15 May, during 2013. To supplement the original surveys, the IRC kindly allowed me to obtain additional vouchers with IRC biologists Issac Osterman, Kalee Koeslag, and Nicole Tamura providing access and assistance on 3 October 2018 and 7 February 2019. A voucher-based checklist was compiled that included 195 taxa. Voucher locations were recorded using coordinates obtained with a Garmin Map60 handheld Global Positioning System (GPS) unit using a WGS 1984 datum.

Specimens were deposited at Rancho Santa Ana Botanic Garden (RSA), with duplicates to University of Riverside (UCR). Plant determinations were made primarily using the *Jepson Manual, Vascular Plants of California, 2nd Edition* (Baldwin et al. 2012). The taxonomy used generally follows Baldwin et al. 2012, Jepson Interchange (2018), *Vascular Plants of Orange County, California, an Annotated Checklist* (Roberts 2008), and *Checklist of the Vascular Plants of San Diego County* (Rebman & Simpson (2014). I am also following treatments published subsequently to the *Jepson Manual, 2nd edition*, including Baker et al. (2012) for the Phrymaceae, and Lubert et al. (2016) for the treatment of the Boraginales.

In addition to reviewing the Consortium of California Herbaria (Consortium 2018) for plant specimens, I have also examined extensive Orange County collections at the herbariums at University of California, Irvine (IRVC), and California State University, Fullerton (MACF) in association with a broader study of the vascular plants of Orange County. These two institutions are only partially represented (IRVC) or not represented (MACF) in the Consortium at the time of this writing. A literature review was conducted on previous documents or studies in the vicinity of Buck Gully.

RESULTS AND DISCUSSION

Previous Botanical Studies

To my knowledge, there are no previously published botanical studies specific to Buck Gully or the Buck Gully Reserve. However, Dudek (2009) created a management plan that considered botanical resources within the study area. Dudek reported about 140 plant taxa observed. Of the plant taxa identified to species observed by Dudek biologists, about 65 percent were native species and about 35 percent were of non-native origin. No voucher specimens were generated in association with unpublished report and unusual observations therefore cannot be verified.

Dudek also reported seven rare or sensitive taxa included in the CNPS Inventory (2018) within the future Reserve including *Atriplex coulteri* (California Rare Plant Rank (CRPR) 1B.2), *Calochortus catalinae* (CRPR 4.2), *Euphorbia misera* (CRPR 2B.2), *Horkelia cuneata* subsp. *puberula* (CRPR 1B.1), *Isocoma menziesii* var. *decumbens* (CRPR 1B.2), *Lasthenia glabrata* subsp. *coulteri* (CRPR 1B.1), and *Quercus dumosa* (CRPR 1B.1). *Calochortus catalinae* was not discussed as a rare plant in the report, but it is included on their species list. Buck Gully does support suitable habitat for this species, including small patches of native grassland, and the species is well documented in the San Joaquin Hills (Allen and Roberts 2013; Roberts 2008; Consortium 2018).

Vegetation

The types and distribution of vegetation were not the focus of my study. I observed coastal sage scrub dominated by an *Artemisia-Eriogonum-Malosma* association, California sagebrush-coyote brush scrub dominated by a *Baccharis consanguinea-Artemisia californica* association, toyon-sumac chaparral domnated by a *Rhus integrifolia-Heteromeles arbutifolia* association, scrub oak chaparral dominated by *Quercus dumosa* or *Q. berberidifolia-Q. berberidifolia/Q. engelmanii* hybrid association, southern willow scrub primarily dominated by *Salix lasiolepis* and *Baccharis salicifolia*, sycamore woodland consisting of *Platanus racemosa*, which were most likely planted, native *Stipa*-dominated grasslands, non-native annual *Bromus-Avena* dominated grasslands, ruderal, and disturbed habitat (Gray & Bramlet 1992).

South-facing slopes are typically more xeric and dominated by coastal sage scrub while the more shaded north-facing slopes host toyon-sumac chaparral and scrub oak chaparral. Beyond the Reserve boundary, the vegetation was thinned within fuel modification zones, especially in the upper canyon. Landscape plantings, consisting largely of *Myoporum rapense* occupy some of the open space margins. Small isolated stands of native perennial grasslands are found primarily near the base of north-facing slopes of the central portion of the reserve.

Flora

Only two specimens, *S. O'Brian s.n., 17 May 1995* (UCR), representing Brachypodium distachyon, and *D. Newell & D. Miller 175* (UCR), representing *Zeltnera venusta* were obtained within the Reserve boundary prior to my study. A recent post-study review of the Consortium revealed six additional specimens at UCR made by Don Newell and Don Miller between 2013 and 2015 (Consortium 2018).

Voucher specimens are available for a total of 201 vascular plant taxa including two hybrids at the Buck Gully Reserve. These taxa were distributed among 63 plant families. Of the total plant taxa, 117 (about 60 percent) were of native origin and 81 taxa (about 40 percent) were of non-native origin. A catalog of the vouchered vascular plant taxa known to occur at the Reserve is included in Appendix A.

Of the taxa documented at the Reserve, 198 taxa were Angiosperms (flowering plants) and three were Pteridophytes (ferns). The six largest families included Asteraceae with 33 taxa, Poaceae with 31 taxa, Fabaceae with 9 taxa, Cyperaceae with 6 taxa, and Rosaceae with 5 taxa. These five families account for 78 species, or about 40 percent of the total species encountered. Below, I have included a statistical summary of the vascular flora of the Buck Gully Reserve in terms of families, genera, subtaxa, non-native and native taxa (Table 1), a summary of the 16 most diverse families including native vs. non-native taxa diversity (Table 2), and a summary of life forms for taxa at the Reserve (Table 3).

Table 1. Statistical summary of the vascular flora of the Buck Gully Reserve.

Group	*Families*	*Genera*	*Species*	*Additional Subtaxa*	*Hybrids*	*Total Taxa*	*Native*	*Non-Native*
Pteridophytes	3	2	3	0	0	3	3 (100%)	0 (0%)
Magnoliophyta	60	148	196	0	2	198	117 (59%)	81 (41%)
Magnoliids	1	1	1	0	0	1	1 (100%)	0 (0%)
Eudicots	49	113	145	0	2	147	94 (64%)	53 (36%)
Monocots	10	34	50	0	0	50	22 (44%)	28 (56%)

Table 2. Fifteen most diverse families at the Buck Gully Reserve

Family	*Species*	*Native (%)*	*Non-Native (%)*
Asteraceae	34	20 (59%)	14 (41%)
Poaceae	32	8 (25%)	24 (75%)
Fabaceae	9	3 (33%)	6 (67%)
Cyperaceae	6	5 (83%)	1 (17%)
Fagaceae	6†	5 (83%)	1 (17%)
Rosaceae	5	5 (100%)	0 (0%)
Anacardiaceae	4	3 (75%)	1 (25%)
Apiaceae	4	1 (25%)	3 (75%)
Brassicaceae	4	0 (0%)	4 (100%)
Chenopodiaceae	4	1 (25%)	3 (75%)
Convolvulaceae	4	3 (75%)	1 (25%)
Lamiaceae	4	3 (75%)	1 (25%)
Onagraceae	4	3 (75%)	1 (25%)
Plantaginaceae	4	3 (75%)	1 (25%)
Polygonaceac	4	3 (75%)	1 (25%)

Table 3. Summary of life forms

Group	*Annual*	*Perennial*	*Suffruticose*	*Shrub*	*Tree*	*Vine*
Pteridophytes	0	3	0	0	0	0
Magnoliophyta	58*	77	12	34	13†	4
Magnoliids	0	1	0	0	0	0
Eudicots	42*	44	12	34	12†	4
Monocots	16	33	0	0	1	0
Total^	58* (30%)	80 (41%)	12 (6%)	34 (18%)	13† (7%)	4 (2%)

*including three biennial species
†including two hybrid members of the genus *Quercus*
^total life forms exceed 100% because of the rounding of numbers.

In addition to full taxa, two oak hybrids, *Quercus berberidifolia* x *Q. engelmannii* and *Q. dumosa* x *Q. berberidifolia*, were found within the study area, mostly in the Pelican Hill tributary.

Quercus dumosa was found along the main drainage at the west end of the reserve, where it had been previously reported, and in the Pelican Hill tributary below Pelican Hills Road. The latter site is apparently an extension of a larger band of plants that once continued onto the northern slopes of Pelican Hill. Much of this stand was lost with the development of the Newport Coast Planned Community at the end of the 1980s. The plants closest to Pelican Hills Road appear to be mostly *Q. dumosa* x *Q. berberidifolia* hybrids. The oaks often have more elongated leaves than typical of *Q. dumosa*, the branches are more ascending than angular, and the trichomes under the leaves vary from few to the more characteristically long arachnoid hairs of typical *Q. dumosa*. An isolated plant that appears to be a hybrid between *Q. dumosa* and *Q. berberidifolia* (*F.M. Roberts, I. Osterman, & K. Koeslag 8626*) was found along Buck Gully Trail in the main drainage.

Quercus engelmannii is largely found in the interiors of Los Angeles County (Pasadena), Riverside County (the Santa Rosa Plateau and foothills of the San Jacinto Mountains), and San Diego County. In Orange County the species is primarily found in the vicinity of State Route 74 at Rancho Mission Viejo and Casper's Wilderness Park (Roberts 2008). Reports of *Quercus engelmannii* are scarce in the San Joaquin Hills (Harrison et al. 1998, Roberts 2008), but shrubs or small trees showing influence of *Q. engelmannii* are more widespread, though often patchy and local.

Quercus berberidifolia x *Q. engelmannii* hybrids within the reserve are represented by a small stand of arborescent shrubs, some approaching tree stature, occurring along the drainage bottom of the Pelican Hill tributary and on the adjacent north-facing slopes. While none of the individuals display the gray-green color of typical *Q. engelmannii*, all individuals displayed longer and broader leaves, and have a more entire and oblong form than typically seen in *Q. berberidifolia*.

Two additional species of interest are *Artemisia palmeri* and *Iva hayesiana*. These two plants were found along the main drainage at the west end of the reserve and were very local in distribution but common where found in the Reserve within a riparian restoration site. Both plants are included in the CNPS Inventory (2018).

Both *Iva hayesiana* and *Artemisia palmeri* increasingly have been planted at restoration sites outside their natural ranges of central San Diego County and northwestern Baja California, Mexico. Several locations are now known for Riverside and Orange Counties (Consortium 2018). Both species appear to have been introduced to the Reserve as part of a restoration effort. Their introduction was likely after 2008 as neither of these fairly obvious species were reported in discussion nor were they included on the species list reported by Dudek (2009).

Individuals of *Chorizanthe staticoides* found in sandy soils in the Pelican Hills tributary are morphologically consistent with the morphology of *C.s.* subsp. *chrysacantha*, historically a List 1B plant in an earlier edition of the CNPS Inventory (CNPS 1988).

The flora of the Buck Gully Reserve, as reported here, appears to be somewhat less diverse than other sites of comparable area. The Tejon State Historic Park, Kern County, was reported to have 238 species within an 83 hectare (205 acres) site (Moe 2004). The University of California Natural Reserve System's San Joaquin Freshwater Marsh Reserve, Orange County, at 82 hectares (202 acres), was reported to have 242 taxa, not including 31 species deliberately introduced for restoration (Bowler and Elvin 2003). However, it should be noted in this later study, different criteria were used for inclusion as 30 percent of the taxa in Bowler and Elvin (2003) did not have a representative voucher collection. Vouchered taxa at the marsh included only 170 taxa, somewhat less than vouchered taxa reported for Buck Gully.

The flora of the Reserve represents about 13 percent of the flora of Orange County as a whole (Roberts 2008). Despite being surrounded by urban development, the ratio of native to non-native species is similar to the county as a whole and is consistent in that Asteraceae, Poaceae, and Fabaceae are the three largest families. However, Rosaceae, the fourth largest family at the Reserve, with 5 species, is not on the County's list of the ten largest families.

While my study was the most detailed examination of the Reserve flora at the time of its completion in 2013, the result should be considered preliminary. Additional surveys would improve our understanding of the Reserve's botanical diversity. Both years in which I conducted the main study were relatively dry. At Laguna Beach, a few kilometers southeast of the Reserve, the 2011/2012 water year (October 2011 - October 2012) had a total precipitation of 147 mm (5.77 inches), or about 40 percent of normal. Unusual for the region, 13 mm (0.53 inches) of this fell in July 2012 due to a tropical disturbance. The precipitation totals during the 2012/2013 water year were comparable though somewhat wetter, with a total of 152 mm (5.97 inches), or roughly 45 percent of normal. These low precipitation values, especially in combination with several previous years with relatively dry conditions, may have reduced plant diversity and abundance at the time of the surveys. The follow-up visit in October 2018 was also conducted in a very dry year.

Both Dudek (2009) and Roberts (2013) list additional species that are not represented by vouchered specimens. Roberts includes 22 additional taxa without representative vouchers. These were typically plants I could not safely reach or which lacked reproductive material at the time of my visits. Dudek includes an additional 35 taxa not vouchered in my study, once implausible species are considered. No vouchers resulted from the Dudek document and identifications of unusual taxa cannot be verified. Fifteen taxa reported by Dudek are unlikely to occur in the San Joaquin Hills including *California macrophylla, Ribes californicum, Salvia leucophylla, Malacothamnus fremontii, Eriogonum thurberi, Cortaderia jubata*, and *Typha angustifolia. Californica macrophylla*, which was considered a CRPR 1B plant at the time of the Dudek study, is otherwise not mentioned or considered in a summary of potentially-occurring rare species in the Dudek report and I am assuming its inclusion was based on a mis-identification or error. Discovering *C. macrophylla* at Buck Gully would be a very significant find in Orange County.

Rare and Sensitive Plant Species

In Orange County, rare and sensitive plant diversity is high in areas where the San Onofre formation underlies the soils. Pelican Hill presented no exception. In the late 1980s, based primarily on the work of Steve Boyd, Karlin Marsh, and myself, Pelican Hill was known to support populations of *Atriplex coulteri, Dichondra occidentalis* (CRPR 4.2), *Dudleya multicaulis* (CRPR 1B.2), *Quercus dumosa*, and *Horkelia cuneata* subsp. *puberula* (CRPR 1B.1), and the at the time CNPS List 1B taxon *Chorizanthe staticoides* subsp. *chrysacantha* (Roberts 2008 and 2013; Consortium 2018). The majority of Pelican Hill was graded and developed prior to 1990. Prior to this study, there has only been limited survey work to determine the status of these plants within the area now managed within the Reserve.

Of the six rare and sensitive species reported by Dudek (2009) to occur at the Reserve, only *Quercus dumosa* was verified at the time of my study. *Horkelia cuneata* subsp. *puberula* was verified at a later date. The occurrence of *Quercus dumosa* was first reported in February 1991 by the author at the west end of what is now the reserve (CNDDB 2018). The *Q. dumosa* site was relocated at this site by Dudek in 2009 and again during this study. A voucher for the site was obtained by the author in 2012 (*F.M. Roberts 7560* [RSA]).

Lack of voucher specimens or substantive observational data render reports for four other rare and sensitive species reported by Dudek (2009) difficult to confirm. A closer examination of information provided in their report and field observations within the Rreserve suggests *Atriplex coulteri, Euphorbia misera, Isocoma menziesii* var. *decumbens,* and *Lasthenia glabrata* subsp. *coulteri* do not occur within the Reserve.

The reports for most of these taxa appear to be based on CNDDB reports for adjacent Pelican Hill or Crystal Cove State Park (CNDDB 2018). Reports for *Isocoma menziesii* var. *decumbens* at Pelican Point, Crystal Cove State Park are based on misidentifications of *I.m.* var. *sedoides* (Roberts 2008). I am not aware of any confirmed confirmed reports of *I.m.* var. *decumbens* from Orange County.

During my study, I observed six rare and sensitive species in the Reserve (See Table 4A). In addition to *Quercus dumosa,* CRPR 1B.1 (see Figure 2A & B), observations included four other native rare plant species included in the CNPS Inventory (2018). *Calochortus weedii* var. *intermedius* (Figure 2C) is included in the CNPS Inventory as CRPR 1B.2, *Horkelia cuneata* subsp. *puberula* (Figure 3A) is included in the Inventory as CRPR 1B.1, *Dichondra occidentalis* (Figure 3B) and *Juncus acutus* subsp. *leopoldii,* are included as CRPR 4.2. In addition to plants with official conservation rank, one additional taxon considered locally rare in Orange County (Roberts 2008) was observed in Buck Gully, *Chorizanthe procumbens* (Figure 3C).

Fritillaria biflora was found in fruit by Isaac Ostermann, Irvine Ranch Conservancy, in 2015. Mr. Osterman supplied coordinates and a photograph of the fruiting plant for purposes of identification and verification, but a voucher specimen was not obtained. This is the only species I include in this study based on photographic evidence (See Figure 4, page 84).

Table 4A. Summary of naturally occurring rare and sensitive plant species at Buck Gully

Scientific Name	***Common Name***	***Family***	***Rank***	***Sites/#***
Calochortus weedii var. *intermedius*	intermediate mariposa lily	Liliaceae	CRPR 1B.2	1/33
Chorizanthe procumbens	prostrate spineflower	Polygonaceae	LR	2/4,035
Dichondra occidentalis	western dichondra	Convolvulaceae	CRPR 4.2	2/na
Fritillaria biflora	chocolate lily	Liliaceae	LR	1/?*
Horkelia cuneata subsp. *puberula*	mesa horkelia	Rosaceae	CRPR 1B.1	3/74
Juncus acutus subsp. *leopoldii*	southwestern spiny rush '	Juncaceae	CRPR 4.2	1/20
Quercus dumosa	Nuttall's Scrub Oak	Fagaeae	CRPR 1B.1	3/419

# Number of individuals counted or estimated.

*Plant not observed in field by author. Identified by photograph, with number of individuals not reported.

CRPR 1B: Plants rare, threatened, and endangered in California and elsewhere.

CRPR 2B: Plants rare, threatened, and endangered in California but more common elsewhere.

CRPR 3: Plants for which additional information is required to determine whether they are truly rare or for which it is unclear which rare plant rank best describes their status

CRPR 4: Plants of limited distribution, sometimes locally rare. A watch list.

LR: Locally Rare in Orange County (Roberts 2008).

Two other taxa, *Pseudognaphalium ramosissimum* (Figure 3D) and *Chorizanthe staticoides* subsp. *chrysacantha* (Figure 3E), were considered locally rare for purposes of habitat management in the report submitted to the IRC (Roberts 2013). A formal proposal to include these taxa on the Orange County list of locally rare taxa will be made in a separate paper. How their inclusion would supplement Table 4 is shown on Table 4B below.

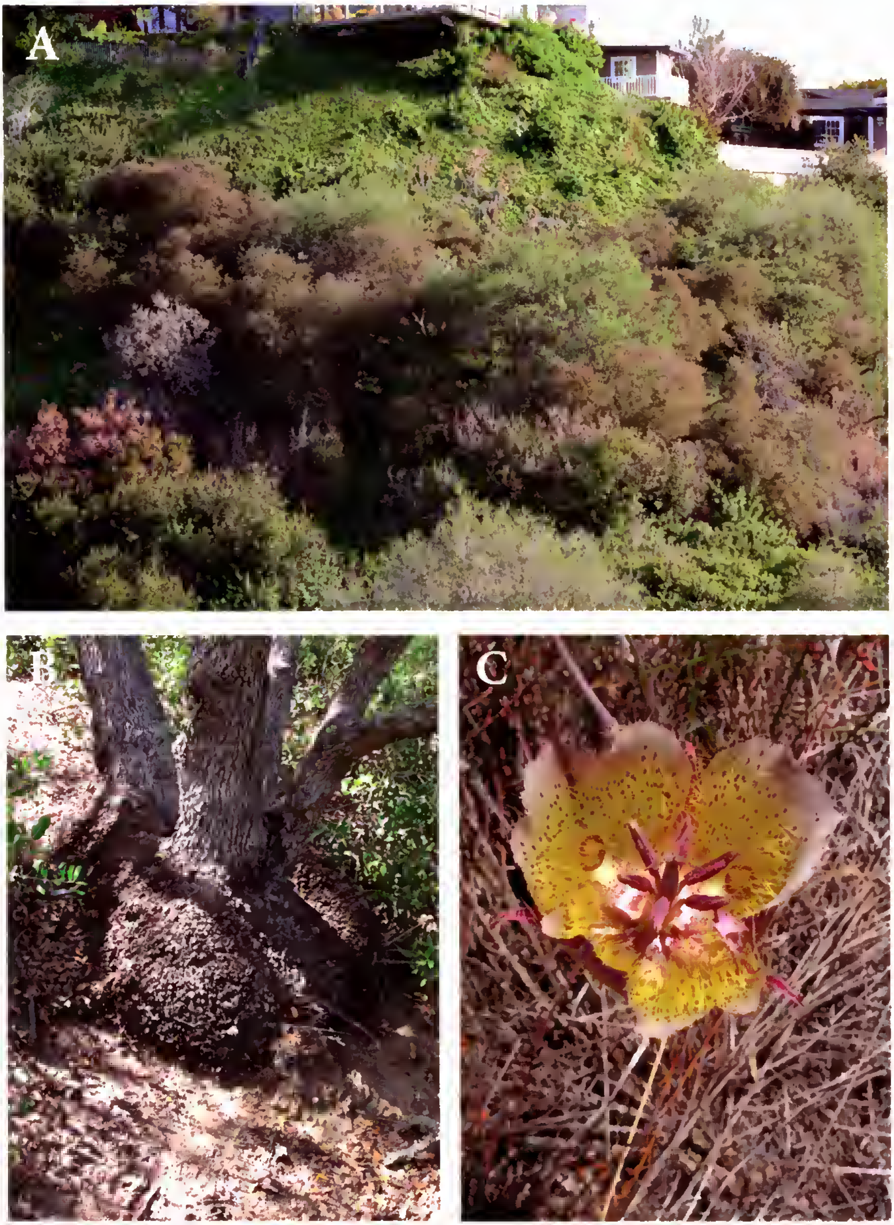

Figure 2: Rare Plants; **A)** *Quercus dumosa* (CRPR 1B.1) at west end of reserve (the olive brown shrubs below the landscaping). Photo shows vulnerable status of plants in the Reserve due to proximity of development; **B)** *Q. dumosa*, basal burl; C) *Calochortus weedii* var. *intermedius* (CRPR 1B.1) flower.

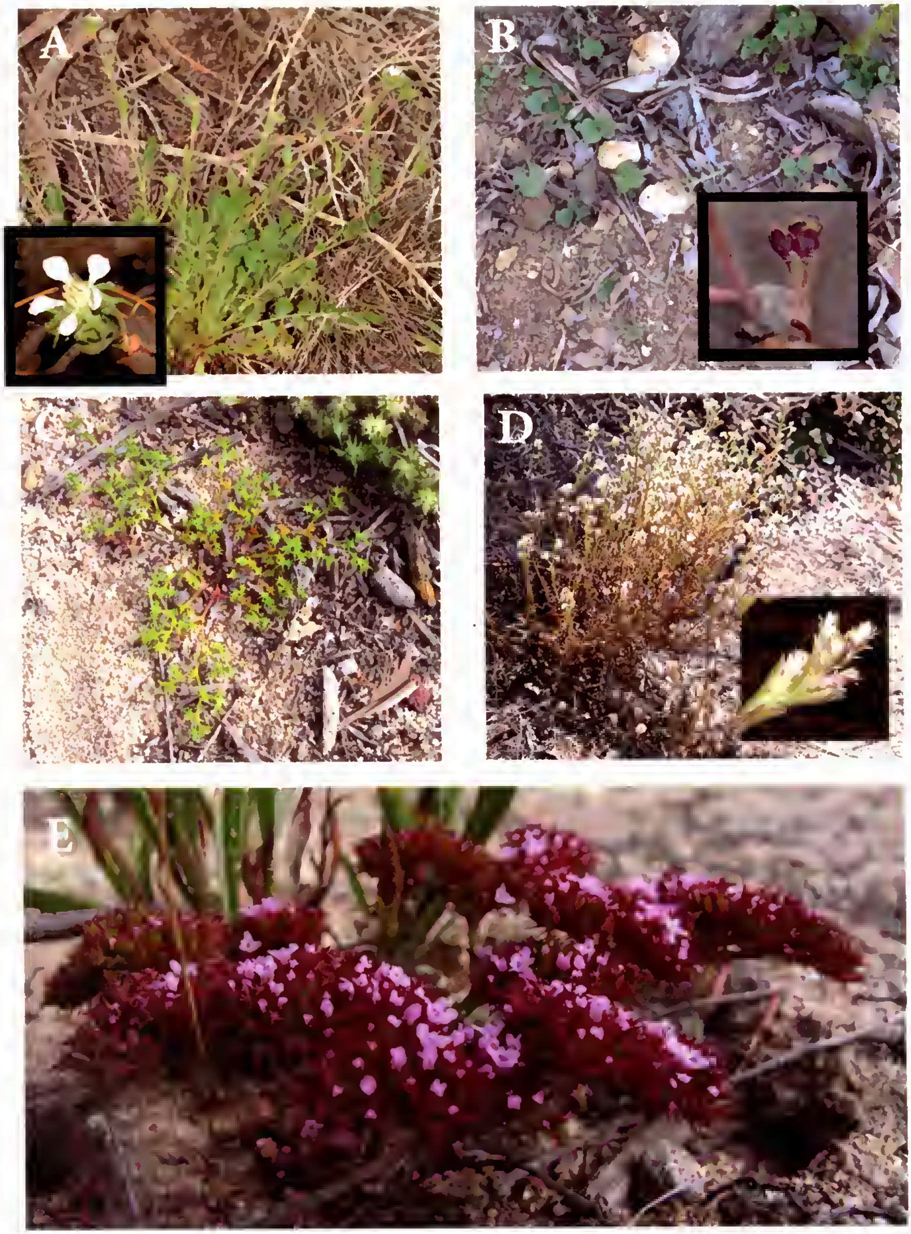

Figure 3: Rare Plants; **A)** ***Horkelia cuneata*** var. ***puberula*** (CRPR 1B.1); inset flower; **B)** *Dichondra occidentalis* (CRPR 4.2), inset, rarely seen subterranean flower; **C)** *Chorizanthe procumbens* (Locally Rare); Taxa of Interest: **D)** *Pseudognaphalium ramosissimum*; inset inflorescence; **E)** *Chorizanthe staticoides* subsp. *chrysacantha*.

Table 4B. Supplemental candidate locally rare plant diversity

Scientific Name	*Common Name*	*Family*	*Rank*	*Indiv.*
Chorizanthe staticoides subsp. *chrysacantha*	Orange County Turkish-rugging	Polygonaceae	-	1/30
Pseudognaphalium ramosissimum	pink everlasting	Asteraceae	-	6/13

Table 5. Summary of rare and sensitive species diversity at Buck Gully

CRPR 1B	CRPR 2B	CRPR 3	CRPR 4	LR	CLR
3	0	0	2	2	2

CLR: Candidate Locally Rare in Orange County

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APPENDIX A: ANNOTATED CATALOG OF THE VASCULAR PLANTS OF THE BUCK GULLY RESERVE, SAN JOAQUIN HILLS, ORANGE COUNTY, CALIFORNIA

The following list includes all vascular plant taxa documented during fieldwork at the Buck Gully Reserve and through herbarium specimens deposited at Rancho Santa Ana Botanic Garden (RSA) and the University of California, Riverside (UCR). The arrangement is alphabetical within major groups (classes, families, genera, and species). Specimens obtained during the survey are listed with my initials and collection number. Other specimens listed include the name of the collector and the date obtained. The nomenclature follows Baldwin et al. 2012, Jepson Online Interchange (2018), *Vascular Plants of Orange County, California, an Annotated Checklist* (Roberts 2008), and *Checklist of the Vascular Plants of San Diego County* (Rebman & Simpson 2014). I am also following some treatments not yet reflected in the Jepson Manual, including Baker et al. (2012) for the Phrymaceae, and Lubert et al. (2016) for the treatment of the Boraginales. The common names largely follow Baldwin et al. (2012), Rebman and Simpson (2014), and Roberts (2008). Non-native or introduced taxa are indicated by an asterisk (*) before the name. Plants considered sensitive by the CNPS or Locally Rare by Roberts (2008) are indicated by a dagger (†).

PTERIDOPHYTES - FERNS AND ALLIES

POLYPODIOPHYTA – FERNS

DRYOPTERIDACEAE - WOOD FERN FAMILY

Dryopteris arguta (Kaulf.) Maxon COASTAL WOOD FERN. Perennial. Scarce on shaded north-facing slopes, especially in central Buck Gully and the Pelican Hill tributary. *F.M. Roberts 7616, 22 Jun 2012* (RSA).

POLYPODIACEAE – POLYPODY FAMILY

Polypodium californicum Kaulf. CALIFORNIA POLYPODY. Perennial from rhizome. Apparently uncommon. Seen in a single patch at base of shady north-facing slope in sumac chaparral along Buck Gully Trail. *F.M. Roberts, K. Koeslag, & N. Tamura 8662, 7 Feb 2019* (RSA).

PTERIDACEAE - LIP FERN FAMILY

Pentagramma triangularis (Kaulf.) Yatsk., Windh., & Wollenw. subsp. ***triangularis*** GOLDENBACK FERN. Perennial. Scarce on shaded slopes. *F.M. Roberts 7740, 11 Apr 2013* (RSA).

ANGIOSPERMS – FLOWERING PLANTS

MAGNOLIIDS - MAGNOLIID CLADE

SAURURACEAE - LIZARD-TAIL FAMILY

Anemopsis californica (Nutt.) Hook. & Arn. YERBA MANSA. Perennial. Occasional to fairly common along the central drainage, mostly at the lower end of the canyon. *F.M. Roberts 7671, 18 Jul 2012* (RSA).

EUDICOTYLEDONS - EUDICOTS

ADOXACEAE - ELDERBERRY FAMILY

Sambucus nigra L. subsp. ***caerulea*** (Raf.) Bolli BLUE ELDERBERRY. Shrub or small tree. Scattered to fairly common. *F.M. Roberts 7519, 24 Apr 2012* (RSA).

AIZOACEAE - CARPET-WEED FAMILY

***Carpobrotus edulis** (L.) N.E. Br. SOUR FIG. Suffruticose succulent perennial. Occasional, mostly adjacent to residential housing bordering the canyon. *F.M. Roberts 7639, 18 Jul 2012* (RSA).

***Malephora crocea** (Jacq.) Schwantes CROCEUM ICE PLANT. Succulent perennial. Overall scarce but locally abundant adjacent to some landscaped slopes. *F.M. Roberts 7664, 18 Jul 2012* (RSA).

ANACARDIACEAE - SUMAC FAMILY

Malosma laurina (Nutt. ex Torr. & A. Gray) Nutt. ex Abrams LAUREL SUMAC. Shrub. Scattered to moderately common. *F.M. Roberts, I. Osterman, & K. Koeslag 8632, 3 Oct 2018* (RSA).

Rhus integrifolia (Nutt.) Benth. & Hook.f. ex Rothr. LEMONADE BERRY. Shrub. Abundant. *F.M. Roberts 7512, 24 Apr 2012* (RSA).

***Schinus terebinthifolius** Raddi BRAZILIAN PEPPER TREE. Tree. Scarce. *F.M. Roberts 7507, 24 Apr 2012* (RSA); *F.M. Roberts, I. Osterman, & K. Koeslag 8639, 3 Oct 2018* (RSA).

Toxicodendron diversilobum (Torr. & A. Gray) Greene POISON OAK. Shrub or woody vine. Common to locally abundant, especially along the floor of the canyon and on shaded north-facing slopes. *F.M. Roberts, I. Osterman, & K. Koeslag 8625, 3 Oct 2018* (RSA).

APIACEAE - CARROT FAMILY

***Apium graveolens** L. COMMON CELERY. Annual or short-lived perennial. Occasional along water courses. *F.M. Roberts 7646, 18 Jul 2012* (RSA).

***Conium maculatum** L. COMMON POISON-HEMLOCK. Biennial. Uncommon along water courses on canyon floor. *F.M. Roberts 7648, 18 Jul 2012* (RSA).

***Foeniculum vulgare** Mill. FENNEL. Perennial. Uncommon in disturbed places *D. Newell & D. Miller 230* (UCR), *F.M. Roberts 7647, 18 Jul 2012* (RSA).

Sanicula crassicaulis DC. PACIFIC SANICLE. Perennial. Scattered along trails and on shrubby slopes. *D. Newell & D. Miller 230, 13 Mar 2012* (UCR); *F.M. Roberts 7577, 10 May 2012* (RSA).

ARALIACEAE - GINSENG FAMILY

***Hedera canariensis** Willd. CANARY ISLANDS IVY. Woody vine. Fairly common adjacent to residential development on the north-facing slope, otherwise scarce. *F.M. Roberts 7642, 18 Jul 2012* (RSA).

ASTERACEAE - SUNFLOWER FAMILY

Ambrosia psilostachya DC. WESTERN RAGWEED. Perennial. Mostly along drainage. *F.M. Roberts 7679, 18 Jul 2012* (RSA).

Artemisia californica Less. COASTAL SAGEBRUSH. Shrub. Abundant, mostly in coastal sage scrub. *F.M. Roberts 7700, 6 Sep 2012* (RSA).

Artemisia douglasiana Besser DOUGLAS' or CALIFORNIA MUGWORT. Perennial. Occasional along central drainage in riparian habitat. *F.M. Roberts, I. Osterman, & K. Koeslag 8624, 3 Oct 2018* (RSA).

*†**Artemisia palmeri** A. Gray PALMER'S SAGEWORT. Biennial or perennial. Planted in association with a riparian restoration project at the lower end of the canyon. Rare in its native range. CRPR 4.2. *F.M. Roberts 7482 5 Apr 2012* (RSA); *F.M. Roberts 7669, 18 Jul 2012* (RSA).

Baccharis pilularis DC. subsp. **consanguinea** (DC.) C.B. Wolf COYOTE BRUSH or CHAPARRAL BROOM. Shrub. Common to locally abundant, especially along the canyon floor. *F.M. Roberts 7702, 6 Sep 2012* (RSA).

Baccharis salicifolia (Ruiz & Pav.) Pers. subsp. **salicifolia** MULE FAT. Shrub. Scattered to fairly common, mostly along drainages. *F.M. Roberts 7703, 6 Sep 2012* (RSA).

***Carduus pycnocephalus** L. ITALIAN THISTLE Annual. Fairly common. *F.M. Roberts 7532, 24 Apr 2012* (RSA).

***Centaurea melitensis** L. TOCALOTE. Annual. Fairly common in disturbed places. *F.M. Roberts 7518, 24 Apr 2012* (RSA).

Corethrogyne filaginifolia (Hook. & Arn.) Nutt. var. **virgata** (Benth.) A. Gray VIRGATE SAND ASTER. Perennial. Scattered, mostly associated with sandy soils in upper Pelican Hill Tributary where plants are somewhat intermediate in appearance to slender-leaved forms *C. f.* var. *incana* and *C.f.* var. *linifolia* in San Diego County but clearly fall-blooming here. *F.M. Roberts 7567, 10 May 2012* (RSA).

Cynara cardunculus L. subsp. ***flavescens*** Wiklund CARDOON or GLOBE ARTICHOKE. Perennial. Scarce in annual grassland. *F.M. Roberts7625, 22 Jun 2012* (RSA).

Encelia californica Nutt. CALIFORNIA ENCELIA. Shrub. Fairly common to locally abundant, especially on south-facing slopes and in restored coastal sage scrub. *F.M. Roberts 7503, 24 Apr 2012* (RSA).

Erigeron foliosus Nutt. var. ***foliosus*** LEAFY DAISY. Perennial. Occasional in coastal sage scrub and toyon-sumac chaparral. *F.M. Roberts 7635, 22 Jun 2012* (RSA).

****Erigeron sumatrensis*** Retz TROPICAL HORSEWEED. Annual. Occasional in disturbed places, mostly along drainages. *F.M. Roberts, I. Osterman, & K. Koeslag 8635, 3 Oct 2018* (RSA).

Eriophyllum confertiflorum (DC.) A. Gray var. ***confertiflorum*** LONG-STEMMED GOLDEN YARROW. Suffrutescent perennial. Occasional in coastal sage scrub. *F.M. Roberts 7523, 24 Apr 2012* (RSA).

****Gazania linearis*** (Thunb.) Druce GAZANIA. Perennial. Uncommon in fuel modification zones. *F.M. Roberts 7580, 10 May 2012* (RSA).

****Glebionis coronarium*** L GARLAND CHRYSANTHEMUM. Annual. Fairly uncommon in disturbed places. *F.M. Roberts 7521, 24 Apr 2012* (RSA).

Grindelia camporum Greene WHITE-STEM GUMPLANT. Perennial. Occasional in grasslands. *D. Newell & D. Miller 174, 14 Jun 2011* (UCR), *F.M. Roberts 7578, 10 May 2012* (RSA).

Hazardia squarrosa (Hook. & Arn.) Greene var. ***grindelioides*** (DC.) Clark SAW-TOOTHED GOLDENBUSH. Shrub. Occasional on dry slopes and along borders of riparian vegetation. *F.M. Roberts, I. Osterman, & K. Koeslag 8628, 3 Oct 2018* (RSA).

Helianthus annuus L. WESTERN SUNFLOWER. Annual. *F.M. Roberts 7665, 18 Jul 2012* (RSA).

****Helminthotheca echioides*** (L.) Holub BRISTLY OX-TONGUE. Annual or biennial. Occasional to fairly common in disturbed or damp places. *F.M. Roberts 7622, 22 Jun 2012* (RSA).

Isocoma menziesii (Hook. & Arn.) G.L. Nesom var. ***menziesii*** SPREADING GOLDENBUSH. Shrub. Fairly common, especially along the canyon floor, lesser drainages, and on restored slopes. *F.M. Roberts 7694, 6 Sep 2012* (RSA).

*†***Iva hayesiana*** A. Gray SAN DIEGO MARSH-ELDER. Perennial or suffrutecent. Locally common at lower end of the canyon where planted and spreading within a riparian restoration area. Rare in its native range. CRPR 2B.2. *F.M. Roberts 7483, 5 Apr 2012* (RSA); *F.M. Roberts 7670, 18 Jul 2012* (RSA).

Lactuca serriola L. PRICKLY or WILD LETTUCE. Annual. Occasional to fairly common in disturbed habitats. *F.M. Roberts 7666, 18 Jul 2012* (RSA).

Leptosyne gigantea Kellogg GIANT TICKSEED. Shrub. Scarce, a single individual persisting as an escape or from planting along San Joaquin Hills Road just west of Canyon Watch Park. *F.M. Roberts 7546, 4 May 2012* (RSA).

Malacothrix saxatilis var. ***tenuifolia*** (Nutt.) A. Gray SLENDER-LEAVED MALACOTHRIX. Perennial. Scattered to fairly common, mostly in open grassy coastal sage scrub or within fuel modification zones. *F.M. Roberts 7661, 18 Jul 2012* (RSA).

Pseudognaphalium biolettii Anderb.] BIOLETTI'S or BICOLORED CUDWEED. Suffruticose perennial. Uncommon, sandy soils, upper Pelican Hill tributary. *F.M. Roberts 7756, 11 Apr 2013* (RSA).

Pseudognaphalium californicum (DC.) Anderb. CALIFORNIA EVERLASTING. Short-lived perennial. Fairly common along drainages and in coastal sage scrub. *F.M. Roberts 7506, 24 Apr 2012* (RSA).

****Pseudognaphalium luteoalbum*** (L.) Hilliard & B.L. Burtt WEEDY CUDWEED. Annual. Occasional along trails and drainages. *F.M. Roberts 7743, 11 Apr 2013* (RSA).

Pseudognaphalium ramosissimum (Nutt.) Anderb. PINK EVERLASTING. Biennial. Occasional in openings and along trails in coastal sage scrub and especially along the canyon floor. Should probably be considered locally rare in Orange County. *F.M. Roberts 7643, 18 Jul 2012* (RSA).

****Pulicaria puludosa*** Link SPANISH SUNFLOWER. Annual to short-lived perennial. Occasional to fairly common along drainages with flowing water. *F.M. Roberts 7655, 18 Jul 2012* (RSA).

****Silybum marinum*** (L.) Gaertn. MILK THISTLE. Patchy in disturbed areas and along trail margins, central drainage. *F.M. Roberts, K. Koeslag, & N. Tamura 8661, 7 Feb 2019* (RSA).

Solidago velutina DC. subsp. ***californica*** (Nutt.) Semple CALIFORNIA GOLDENROD. Perennial. Patchy along canyon floor, mostly in willow scrub. *F.M. Roberts, I. Osterman, & K. Koeslag 8630, 3 Oct 2018* (RSA).

****Sonchus asper*** (L.) Hill PRICKLY SOW-THISTLE. Annual. Occasional in disturbed places, along drainages, and in annual grassland. *F.M. Roberts 7574, 10 May 2012* (RSA).

****Sonchus oleraceus*** L. COMMON SOW THISTLE. Annual. Occasional to fairly common, mostly along trails and in disturbed habitat. *F.M. Roberts, K. Koeslag, & N. Tamura 8656, 7 Feb 2019* (RSA).

Stylocline gnaphaloides Nutt. EVERLASTING NEST-STRAW. Annual. Uncommon, mostly along trail margins. *F.M. Roberts 7570, 10 May 2012* (RSA).

Xanthium strumarium L. COCKLEBUR. Annual. Uncommon along creek, canyon floor, mostly in more open areas. *F.M. Roberts, I. Osterman, & K. Koeslag 8631, 3 Oct 2018* (RSA).

BORAGINACEAE - BORAGE FAMILY

[Excluding *Heliotropium* (Heliotropaceae), *Eucrypta* and *Phacelia* (Hydrophyllaceae)]

Cryptantha intermedia (A. Gray) Greene var. ***intermedia*** COMMON CRYPTANTHA. Annual. Occasional in sandy soils. *F.M. Roberts 7563, 10 May 2012* (RSA).

Echium candicans L. f. PRIDE OF MADERA. Shrub. Uncommon, several plants found on restored cut slope adjacent to San Joaquin Hills Road just west of Canyon Watch Park; scarce along central drainage. *F.M. Roberts 7545, 4 May 2012* (RSA).

BRASSICACEAE (CRUCIFERAE) - MUSTARD FAMILY

Brassica geniculata (Desf.) J. Ball [*Hirschfeldia incana* (L.) Lagr.-Fossatl] SHORTPOD or SUMMER MUSTARD Perennial. Fairly common, especially in disturbed areas. *F.M. Roberts 7505, 24 Apr 2012* (RSA).

Brassica nigra (L.) W.D.J. Koch BLACK MUSTARD. Annual. Occasional to fairly common. *F.M. Roberts 7526, 24 Apr 2012* (RSA).

Nasturtium officinale W.T. Aiton WHITE WATERCRESS. Perennial. Common along drainages, especially in flowing water. *F.M. Roberts 7698, 6 Sep 2012* (RSA).

Sisymbrium altissimum L. TUMBLE MUSTARD. Annual. Scarce. A few individuals along disturbed roadside, San Joaquin Hills Drive. *F.M. Roberts 7773, 15 May 2013* (RSA).

CACTACEAE - CACTUS FAMILY

Opuntia xoccidentalis Engelm. & J.M. Bigelow WESTERN PRICKLY PEAR. Shrub. Scattered in upper Pelican Hill tributary and on south-facing slopes of Lower Buck Gully. *F.M. Roberts 7637, 22 Jun 2012* (RSA).

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY

Symphoricarpos mollis Nutt. CREEPING SNOWBERRY. Shrub. Fairly common at base of north-facing slope in dense toyon-sumac chaparral along central drainage west of the junction of Buck Gully Trail and Bobcat Trail. *D. Newelll & C. Packer 278, 3 Jul 2012* (UCR); *F.M. Roberts 7741, 11 Apr 2013* (RSA).

CARYOPHYLLACEAE - PINK FAMILY

Cardionema ramosissimum (Weinm.) A. Nelson & J.F. Macbr. SAND MAT. Perennial. Occasional on sand in upper Pelican Hill tributary. *F.M. Roberts 7568, 10 May 2012* (RSA).

Silene laciniata Cav. subsp. ***laciniata*** SOUTHERN PINK. Perennial. Mostly associated with sandy soils and coastal sage scrub adjacent to Pelican Hills Drive. *F.M. Roberts 7584, 10 May 2012* (RSA).

CHENOPODIACEAE – GOOSFOOT FAMILY

****Atriplex semibaccata*** R. Braun AUSTRALIAN SALTBUSH. Shrubby perennial. Occasional in disturbed places. *F.M. Roberts 7632, 22 Jun 2012* (RSA).

Chenopodium californicum (S. Watson) S. Watson CALIFORNIA GOOSEFOOT. Perennial. Occasional along central drainage. *F.M. Roberts 7744, 11 Apr 2013* (RSA).

****Dysphania ambrosioides*** (L.) Mosyakin & Clemants MEXICAN TEA. Annual. *F.M. Roberts 7668, 18 Jul 2012* (RSA).

****Salsola australis*** R. Braun AUSTRALIAN TUMBLEWEED. Annual. Occasional in disturbed places. *F.M. Roberts 7513, 24 Apr 2012* (RSA); *D. Newell & D. Miller 305, 9 Oct 2012* (UCR).

CISTACEAE - ROCK-ROSE FAMILY

****Cistus incanus*** L. PURPLE ROCK-ROSE. Shrub. Occasional, persisting from plantings and spreading along Pelican Hills Drive. *F.M. Roberts 7760, 11 Apr 2013* (RSA).

Crocanthemum scoparium (Nutt.) Millsp. [*Helianthemum s.* Nutt.] CALIFORNIA RUSH ROSE. Suffrutescent perennial. Occasional on sandy soils in open coastal sage scrub at the top of Pelican Hill tributary. *F.M. Roberts 7565, 10 May 2012* (RSA).

CLEOMACEAE - CLEOME FAMILY

Peritoma arborea Nutt. BLADDERPOD. Shrub. Occasional on dry slopes in coastal sage scrub. *F.M. Roberts 7504, 24 Apr 2012* (RSA).

CONVOLVULACEAE - MORNING-GLORY FAMILY

Calystegia macrostegia (Greene) Brummitt subsp. ***cyclostegia*** (House) Brummitt PURPLE-BRACTED MORNING-GLORY. Perennial vine. *F.M. Roberts 7499, 24 Apr 2012* (RSA).

****Convolvulus arvensis*** L. FIELD BINDWEED. Perennial vine. *F.M. Roberts 7582, 10 May 2012* (RSA).

Cuscuta californica Hook. & Arn. var. ***californica*** CALIFORNIA DODDER. Parasitic annual vine. Uncommon on shrubs in coastal sage scrub, Pelican Hill tributary. *F.M. Roberts 7618, 22 Jun 2012* (RSA).

†***Dichondra occidentalis*** House WESTERN DICHONDRA. Perennial. Uncommon, north-facing slopes at edge of sumac chaparral, Pelican Hill tributary. Rare. CRPR 4.2. *F.M. Roberts 7571, 10 May 2012* (RSA).

CRASSULACEAE - STONECROP FAMILY

Crassula connata (Ruiz & Pav.) A. Berger SAND PYGMY-STONECROP. Succulent annual. Occasional in sandy soils along old roads and in openings of coastal sage scrub, upper Pelican Hill tributary. *F.M. Roberts 7755, 11 Apr 2013* (RSA).

Dudleya lanceolata (Nutt.) Britton & Rose LANCE-LEAF LIVE-FOREVER. Occasional on sandy soils in upper Pelican Hill tributary, scarce elsewhere. *F.M. Roberts 7636, 22 Jun 2012* (RSA).

CUCURBITACEAE - GOURD FAMILY

Cucurbita foetidissima Kunth CALABAZILLA. Trailing perennial vine. Uncommon to occasional in grassy areas. *F.M. Roberts 7659, 18 Jul 2012* (RSA).

Marah macrocarpus (E. Greene) Greene var. ***macrocarpus*** WILD CUCUMBER or CUCAMONGA MANROOT. Trailing perennial vine from massive tuber. Scattered to fairly scrambling over sumac chaparral and in riparian vegetation. *F.M. Roberts, K. Koeslag, & N. Tamura 8658, 7 Feb 2019* (RSA).

EUPHORBIACEAE - SPURGE FAMILY

Croton californicus Mull. Arg. CALIFORNIA CROTON. Shrubby perennial. Fairly common on sandy soils in openings of coastal sage scrub and scrub oak chaparral, upper Pelican Hill tributary. *F.M. Roberts 7754, 11 Apr 2013* (RSA).

****Euphorbia peplus*** L. PETTY SPURGE. Annual. Occasional to fairly common in disturbed places. *F.M. Roberts 7729, 11 Apr 2013* (RSA).

Euphorbia polycarpa Benth. [*Chamaesyce polycarpa* (Benth.) Millsp.] GOLONDRINA or SMALL-SEED SANDMAT. Perennial. Occasional. *F.M. Roberts 7514, 24 Apr 2012* (RSA).

FABACEAE (LEGUMINOSAE) - PEA FAMILY

****Acacia longifolia*** (Andrews) Willd. SYDNEY GOLDEN WATTLE. Shrub or small tree. Scattered individuals along roads and on disturbed slopes. *F.M. Roberts 7695, 6 Sep 2012* (RSA).

Acacia redolens Maslin VANILLA-SCENTED WATTLE. Shrub. Common to abundant in surrounding landscaping, spreading at scattered sites into the Reserve. *F.M. Roberts 7497, 24 Apr 2012* (UCR);

Acacia saligna (Labill.) H. Wendl. GOLDEN WREATH WATTLE. Shrub or small tree. Occasional on disturbed slopes, fuel modification zone, upper Pelican Hill tributary and disturbed coastal sage scrub along San Joaquin Hills Drive. *F.M. Roberts 7631, 22 Jun 2012* (RSA); *F.M. Roberts 7774, 15 May 2013* (RSA).

Acmispon glaber (Vogel) Brouillet var. ***glaber*** COASTAL DEERWEED. Shrubby perennial. Scattered to fairly common in coastal sage scrub. *F.M. Roberts 7525, 24 Apr 2012* (RSA).

Lathyrus vestitus Nutt. subsp. ***vestitus*** CHAPARRAL SWEET PEA. Twining perennial. Occasional in riparian woodland, central canyon. *F.M. Roberts 7746, 11 Apr 2013* (RSA).

Lupinus succulentus K. Koch ARROYO LUPINE. Annual. Uncommon to occasional in grasslands. *F.M. Roberts 7733, 11 Apr 2013* (RSA).

Medicago polymorpha L. BUR-CLOVER. Annual. Fairly common along paths and in annual grassland. *F.M. Roberts 7730, 11 Apr 2013* (RSA).

Melilotus alba Medik. WHITE SWEET-CLOVER. Annual or biennial. Occasional weed. *F.M. Roberts 7530, 24 Apr 2012* (RSA).

Melilotus indicus (L.) All. YELLOW SWEET-CLOVER. Annual. Occasional weed. *F.M. Roberts 7520, 24 Apr 2012* (RSA).

FAGACEAE - OAK FAMILY

Quercus agrifolia Nee var. ***agrifolia*** COAST LIVE OAK. Tree. Scattered plantings along margin, occasional native in riparian woodland along central drainage. Planted: *F.M. Roberts 7727, 11 Apr 2013* (RSA), native: *F.M. Roberts 7750, 11 Apr 2013* (RSA).

Quercus berberidifolia Liebm. CALIFORNIA SCRUB OAK. Shrub. Pelican Hill tributary. *F.M. Roberts 7583, 10 May 2012* (RSA).

Quercus berberidifolia x ***Q. dumosa*** Nutt. Shrub. Primarily in chaparral at upper end of Pelican Hill tributary near Pelican Hills Drive. A lone individual along Buck Gully Trail. *F.M. Roberts 7561, 10 May 2012* (RSA); *F.M. Roberts 7759, 11 Apr 2013* (RSA); *F.M. Roberts, I. Osterman, & K. Koeslag 8626, 3 Oct 2018* (RSA).

Quercus berberidifolia x ***Q. engelmannii*** Greene. Small tree. Upper Pelican Hill tributary. *F.M. Roberts 7617, 22 Jun 2012* (RSA).

†***Quercus dumosa*** Nutt. NUTTALL'S SCRUB OAK. Shrub. Chaparral and coastal sage scrub, north-facing slopes, west end of reserve along main drainage and along Pelican Hill tributary. CRPR 1B.1. *F.M. Roberts 7560, 10 May 2012* (RSA); *F.M. Roberts 7638, 18 Jul 2012* (RSA), *CNPS Accuracy Assessment Team 3266, 10 Jul 2014* (RSA).

Quercus ilex L. HOLLY OAK. Tree. A single individual growing along border of riparian habitat in main drainage along Buck Gully Trail. *F.M. Roberts, I. Osterman, & K. Koeslag 8628, 3 Oct 2018* (RSA).

FRANKENIACEAE - ALKALI HEATH FAMILY

Frankenia salina (Molina) I.M. Johnst. ALKALI HEATH. Shrubby perennial, often forming mats. Scarce, a single individual at the edge of the restoration site near Poppy Street, Lower Canyon. Somewhat shaded individual is unusually tall, with delicate stems to 1.5 meters tall. *F.M. Roberts 7654, 18 Jul 2012* (RSA).

GENTIANACEAE - GENTIAN FAMILY

Zeltnera venusta (A. Gray) G. Mans. [*Centaurium venustum* (A. Gray) Robinson] CANCHALAGUA. Annual. Uncommon. *D. Newell & D. Miller 175, 14 Jun 2011* (UCR); *D. Newell, D. Miller, & S. Oagarile 275, 19 Jun 2012* (UCR).

GERANIACEAE - GERANIUM FAMILY

Erodium botrys (Cav.) Bertol. LONG-BEAKED FILAREE. Annual. Occasional. *F.M. Roberts 7734, 11 Apr 2013* (RSA).

Erodium cicutarium (L.) L'Her. RED-STEMMED FILAREE. Annual. Fairly common in disturbed places and annual grassland. *F.M. Roberts 7527, 24 Apr 2012* (RSA).

Geranium carolinianum L. CAROLINA GERANIUM. Annual. Uncommon in shaded places along central drainage. *F.M. Roberts 7747, 11 Apr 2013* (RSA).

GROSSULARIACEAE - GOOSEBERRY FAMILY

Ribes speciosum Pursh FUCHSIA-FLOWERED GOOSEBERRY. Deciduous shrub. Occasional on north-facing slopes in toyon-sumac chaparral. *D. Newell & D. Miller 415, 1 Dec 2015* (UCR); *F.M. Roberts, I. Osterman, & K. Koeslag 8627, 3 Oct 2018* (RSA); *F.M. Roberts, K. Koeslag, & N. Tamura 8659, 7 Feb 2019* (RSA).

HELIOTROPACEAE - HELIOTROPE FAMILY

Heliotropium curassavicum L. subsp. ***oculatum*** (A. Heller) Tidestr. SALT or ALKALI HELIOTROPE. Perennial. Uncommon, mostly in grassy fuel modification zones. *F.M. Roberts 7629, 22 Jun 2012* (RSA).

HYDROPHYLLACEAE - WATERLEAF FAMILY

Eucrypta chrysanthemifolia (Benth.) Greene var. ***chrysanthemifolia*** COMMON EUCRYPTA. Annual. Occasional along drainage in openings of toyon-sumac chaparral in the central drainage. *F.M. Roberts 7742, 11 Apr 2013* (RSA).

Phacelia parryi Torr. PARRY'S PHACELIA. Annual. Occasional, open habitats. *F.M. Roberts 7515, 24 Apr 2012* (RSA).

Phacelia ramosissima Douglas ex Lehm. BRANCHING PHACELIA. Perennial. Occasional to fairly common, mostly along central drainage. *F.M. Roberts 7640, 18 Jul 2012* (RSA); *F.M. Roberts 7663, 18 Jul 2012* (RSA).

LAMIACEAE - MINT FAMILY

***Marrubium vulgare** L. COMMON HOREHOUND. Perennial. Seattered in disturbed places. *F.M. Roberts, I. Osterman, & K. Koeslag 8634* (RSA).

Salvia apiana Jeps. WHITE SAGE. Shrub. A few individuals growing on a road cut along Buck Gully Trail in the upper canyon. Likely these plants planted as part of a restoration project. *F.M. Roberts 7528, 24 Apr 2012* (RSA).

Salvia mellifera Greene BLACK SAGE. Shrub. Commmon in coastal sage scrub, especially on south-facing slopes. *F.M. Roberts 7502, 24 Apr 2012* (RSA).

Stachys rigida Nutt. subsp. ***quercetorum*** (A. Heller) Epling HILLSIDE HEDGE-NETTLE Perennial. Occasional in grassy openings, often with patches of native grassland, often on somewhat mesic slopes. *D. Newell & D. Miller 251, 15 May 2012* (UCR); *F.M. Roberts 7573, 10 May 2012* (RSA).

MALVACEAE - MALLOW FAMILY

Malacothamnus fasciculatus (Nutt.) Greene subsp. ***laxiflorus*** (A. Gray) Thorne LAX-FLOWERED BUSHMALLOW. Shrub. Scattered, mostly in coastal sage scrub. *F.M. Roberts 7633, 22 Jun 2012* (RSA).

***Malva parviflora** L. CHEESEWEED. Annual. Fairly common in disturbed places. *F.M. Roberts 7529, 24 Apr 2012* (RSA).

MYRSINACEAE - MYRSINE FAMILY

***Lysimachia arvensis** (L.) U. Manns & Anderb. [*Anagallis a.* L.] SCARLET PIMPERNEL. Annual. Occasional to fairly common weed, especially in damp, disturbed places and adjacent to water courses. *F.M. Roberts 7516, 24 Apr 2012* (RSA).

NYCTAGINACEAE - FOUR-O'CLOCK FAMILY

Mirabilis laevis (Benth.) Curran var. ***crassifolia*** (Choisy) Spellenberg CALIFORNIA WISHBONE BUSH. Suffrutescent. Occasional on slopes in coastal sage scrub. *F.M. Roberts 7501, 24 Apr 2012* (RSA).

ONAGRACEAE - EVENING PRIMROSE FAMILY

Camissoniopsis bistorta (Torr. & A. Gray) W.L. Wagner & Hoch CALIFORNIA SUNCUP. Annual. Uncommon on sandy soils in openings of coastal sage scrub and scrub oak chaparral, upper Pelican Hill tributary. *F.M. Roberts 7758, 11 Apr 2013* (RSA).

Epilobium canum Greene subsp. ***canum*** NARROW-LEAVED FUCHSIA. Fall-flowering perennial, sometimes shrubby. Occasional, coastal sage scrub, grassland. *F.M. Roberts 7660, 18 Jul 2012* (RSA).

Epilobium ciliatum Raf. subsp. ***ciliatum*** GREEN WILLOW-HERB. Perennial. Occasional along watercourses. *F.M. Roberts 7626, 22 Jun 2012* (RSA).

***Oenothera speciosa** Nutt. PRAIRIE PRIMROSE. Perennial. A patch growing within the fuel modification zone below houses in association with excess irrigation flow, western canyon. *F.M. Roberts 7772, 15 May 2013* (UCR).

OROBANCHACEAE - BROOM-RAPE FAMILY

Castilleja affinis Hook. & Arn. subsp. ***affinis*** COASTAL PAINTBRUSH. Perennial. Occasional in mixed coastal sage scrub and grassland. *F.M. Roberts 7576, 10 May 2012* (RSA).

PHRYMACEAE - HOPSEED and MONKEYFLOWER FAMILY

Diplacus x ***australis*** (Munz) Tulig [*Mimulus aurantiacus*] Curtis BUSH MONKEYFLOWER shrub. Occasional in coastal sage scrub and sumac chaparral. *F.M. Roberts 7522, 24 Apr 2012* (RSA).

PITTOSPORACEAE - PITTOSPORUM FAMILY

***Pittosporum undulatum** Vent. VICTORIAN BOX. Tree. Scarce escape in lower canyon. *F.M. Roberts 7644, 18 Jul 2012* (RSA).

PLANTAGINACEAE - PLANTAIN FAMILY

Keckiella cordifolia (Benth.) Straw. HEART-LEAVED BUSH-PENSTEMON. Shrub. *F.M. Roberts 7619, 22 Jun 2012* (RSA).

Nuttallanthus texanus (Scheele) D.A. Sutton BLUE TOAD-FLAX. Annual. Uncommon on sandy soils in open coastal sage, upper Pelican Hills tributary. *F.M. Roberts 7752, 11 Apr 2013* (RSA).

Plantago erecta E. Morris CALIFORNIA PLANTAIN. Annual. Uncommon to occasional annual on sandy soils along paths and in openings of coastal sage scrub, upper Pelican Hills tributary. *F.M. Roberts 7753, 11 Apr 2013* (RSA).

*****Plantago major*** L. COMMON PLANTAIN. Perennial. Occasional in damp places, central drainage. *F.M. Roberts 7649, 18 Jul 2012* (RSA).

PLATANACEAE - SYCAMORE FAMILY

*****Platanus** x**hispanica*** Munchh. LONDON PLANE TREE. Tree. Fairly common in the upper canyon where undoubtedly planted. Likely mistaken for *P. racemosa*. *F.M. Roberts 7495, 24 Apr 2012* (RSA).

Platanus racemosa Nutt. CALIFORNIA SYCAMORE. Tree. Occasional large individuals along the drainage in the central canyon. *F.M. Roberts 7748, 11 Apr 2013* (RSA).

POLEMONIACEAE - PHLOX FAMILY

Eriastrum sapphirinum (Eastw.) H. Mason subsp. ***dasyanthem*** (Brand) H. Mason MANY-FLOWERED WOOLLY-STAR. Annual. Uncommon annual in sandy soils, scrub oak chaparral, upper Pelican Hill tributary. *F.M. Roberts 7564, 10 May 2012* (RSA).

POLYGONACEAE - BUCKWHEAT FAMILY

†***Chorizanthe procumbens*** Nutt. PROSTRATE SPINEFLOWER. Annual. Generally uncommon and patchy in sandy openings of coastal sage scrub and scrub oak chaparral, north-facing slopes, upper Pelican Hill Tributary. Locally Rare. *F.M. Roberts 7569, 10 May 2012* (RSA).

Chorizanthe staticoides Benth. subsp. ***chrysacantha*** (Godman) Munz [*C. staticoides* Benth. *sensu* Costea & Reveal (2012)] ORANGE COUNTY TURKISH RUGGING. Annual. Uncommon and patchy on sandy soils in openings of scrub oak chaparral, north-facing slopes, upper Pelican Hill tributary. Due to restricted distribution and habitat loss, should probably be considered locally rare. *F.M. Roberts 7566, 10 May 2012* (RSA).

Eriogonum fasciculatum Benth. var. ***fasciculatum*** CALIFORNIA BUCKWHEAT. Shrub. Fairly common in coastal sage scrub. *F.M. Roberts 7498, 24 Apr 2012* (RSA).

*****Persicaria lapathifolia*** (L.) A. Gray WILLOW SMARTWEED. Annual. Scarce along watercourses. *F.M. Roberts 7656, 18 Jul 2012* (RSA).

RANUNCULACEAE - CROWFOOT FAMILY

Ranunculus californicus Benth. CALIFORNIA BUTTERCUP. Perennial. Occasional on grassy, north-facing slopes and in woodland along central drainage. *F.M. Roberts 7531, 24 Apr 2012* (RSA).

RHAMNACEAE - BUCKTHORN FAMILY

Frangula californica (Eschsch.) A. Gray subsp. ***californica*** CALIFORNIA COFFEE BERRY. Shrub. Occasional on sandy soil in coastal sage scrub, upper Pelican Hill tributary. *F.M. Roberts 7761, 11 Apr 2013* (RSA).

Rhamnus ilicifolia Kellogg HOLLY-LEAVED REDBERRY. Shrub. Occasional, mixture of scrub oak and sumac chaparral. *F.M. Roberts 7562, 10 May 2012* (RSA).

ROSACEAE - ROSE FAMILY

Drymocallis glandulosa (Lindl.) Rydb. var. ***wrangellianus*** (Fisch. & Ave-Lall.) Ertter WRANGEL'S CINQUEFOIL. Perennial. Occasional to fairly common at base of shaded slopes, toyon-sumac chaparral and riparian woodland, central drainage. *F.M. Roberts 7737, 11 Apr 2013* (RSA).

Heteromeles arbutifolia (Lindl.) Roem. TOYON or CHRISTMAS BERRY. Shrub. Fairly common on shaded slopes, especially in toyon-sumac chaparral and riparian woodlands. *F.M. Roberts 7630, 22 Jun 2012* (RSA).

†***Horkelia cuneata*** Lindl. subsp. ***puberula*** (Rydb.) Ertter & Reveal MESA HORKELIA. Perennial. Patchy, occasional to fairly common on sandy soils in openings of coastal sage scrub and scrub oak chaparral, upper Pelican Hill tributary. Historically, but not currently known in Orange Co. only on neighboring Pelican Hill. CRPR 1B.1. *F.M. Roberts 7751, 11 Apr 2013* (RSA).

Rosa californica Cham. & Schldl. CALIFORNIA ROSE. Shrub. Uncommon along central drainage. *F.M. Roberts, I. Osterman, & K. Koeslag 8636, 3 Oct 2018* (RSA).

Rubus ursinus Cham. & Schldl. CALIFORNIA BLACKBERRY. Shrub. Occasional along central drainage. *F.M. Roberts 7749, 11 Apr 2013* (RSA).

RUBIACEAE - MADDER FAMILY

Galium angustifolium Nutt. subsp. ***angustifolium*** NARROW-LEAVED BEDSTRAW. Shrubby perennial. Occasional in coastal sage scrub and sumac chaparral. *F.M. Roberts 7579, 10 May 2012* (RSA).

Galium nuttallii A. Gray subsp. ***nuttallii*** SAN DIEGO BEDSTRAW. Clambering woody perennial, occasional, coastal sage scrub. *F.M. Roberts 7500, 24 Apr 2012* (RSA).

Galium porrigens Dempster var. ***porrigens*** CLIMBING BEDSTRAW. Clambering woody perennial. Uncommon along Buck Gully Trail in the main canyon. *F.M. Roberts 7738, 11 Apr 2013* (RSA).

SALICACEAE - WILLOW FAMILY

Populus fremontii S. Watson subsp. ***fremontii*** FREMONT COTTONWOOD. Tree. A lone individual at the south end of the central drainage associated with a riparian restoration area. Almost certainly planted. *F.M. Roberts, I. Osterman, & K. Koeslag 8638, 3 Oct 2018* (RSA).

Salix exigua Nutt. var. ***hindsiana*** (Benth.) Dorn NARROW-LEAVED WILLOW. Shrub. Occasional in lower canyon, apparently associated with riparian restoration and possibly introduced to the canyon. *F.M. Roberts 7675, 18 Jul 2012* (RSA).

Salix lasiolepis Benth. ARROYO WILLOW. Tree. Common along drainages in riparian woodland and riparian scrub. *F.M. Roberts 7507, 24 Apr 2012* (RSA).

SAXIFRAGACEAE - SAXIFRAGE FAMILY

Jepsonia parryi (Torr.) Small COAST JEPSONIA. Uncommon on shaded mesic hillsides. *D. Newell & D. Miller 411, 20 Oct 2015* (UCR).

SCROPHULARIACEAE - FIGWORT FAMILY

***Myoporum rapense** f. Brown. FRENCH POLYNESIAN MYOPORUM. Shrub. Fairly common in landscaping adjacent to canyon. Becoming sparingly established and spreading into wildlands, especially within fuel modification zones. New addition to Orange County flora. *F.M. Roberts 7496, 24 Apr 2012* (RSA).

Scrophularia californica Cham. & Schldl. subsp. ***floribunda*** (Greene) Shaw CALIFORNIA FIGWORT. Perennial. Uncommon, coastal sage scrub. *F.M. Roberts 7572, 10 May 2012* (RSA).

SOLANACEAE - NIGHTSHADE FAMILY

***Nicotiana glauca** Graham TREE TABACCO. Shrub or small tree. Scattered, coastal sage scrub, disturbed areas. *F.M. Roberts, K. Koeslag, & N. Tamura 8660, 7 Feb 2019* (RSA)

Solanum douglasii Dunal DOUGLAS' NIGHTSHADE. Perennial, sometimes shrubby. Occasional, mostly in coastal sage scrub and riparian areas. *F.M. Roberts 7645, 18 Jul 2012* (RSA).

Eleocharis macrostachya Britton PALEN SPIKE-RUSH. Perennial. Growing along watercourse in restoration area near Poppy Street. *F.M. Roberts 7674, 18 Jul 2012* (RSA).

Schoenoplectus americanus (Pers.) Volkort ex Schinz & R. Keller [*Scirpus a.* Pers.; *S. olneyi* A. Gray] OLNEY'S BULRUSH. Perennial. Occasional growing in flowing water, lower canyon. *F.M. Roberts 7673, 18 Jul 2012* (RSA).

Schoenoplectus californicus (C.A. Mey.) Sojak [*Scirpus c.* (C.A. Mey.) Steud.] CALIFORNIA BULRUSH. Perennial. Growing along watercourse in restoration area near Poppy Street. *F.M. Roberts 7672, 18 Jul 2012* (RSA).

IRIDACEAE - IRIS FAMILY

Sisyrinchium bellum S. Watson CALIFORNIA BLUE-EYED GRASS. Perennial. Occasional to fairly common in grassy places. *F.M. Roberts 7536, 24 Apr 2012* (RSA).

JUNCACEAE - RUSH FAMILY

†***Juncus acutus*** L. subsp. ***leopoldii*** (Parl.) Snogerup SOUTHWESTERN SPINY RUSH. Perennial. Uncommon, found only in lower canyon in restoration area near Poppy Street. Possibly introduced to the reserve during restoration. *F.M. Roberts 7485, 5 Apr 2012* (RSA).

Juncus patens E. Mey SPREADING RUSH. Perennial. Occasional to fairly common along Buck Gully Trail and along creek, especially lower canyon. *F.M. Roberts 7662, 18 Jul 2012* (RSA).

Juncus xiphioides E. Mey. IRIS-LEAVED RUSH. Perennial. Scattered along creek. *F.M. Roberts 7657, 18 Jul 2012* (RSA).

LILIACEAE - LILY FAMILY

†***Calochortus weedii*** Alph. Wood var. ***intermedius*** Ownbey INTERMEDIATE MARIPOSA LILY. Perennial from bulb. Found only on sandy soils in openings of coastal sage scrub and scrub oak chaparral, upper Pelican Hill tributary. Rare. CRPR 1B.1. *F.M. Roberts 7634, 22 Jun 2012* (RSA).

†***Fritillaria biflora*** Lindl. var. ***biflora***. CHOCOLATE LILY. Perennial. Scarce in grassland, known only from a photograph of a fruiting individual supplied by Isaac Ostermann, IRC, taken in the central drainage, June 2015 (See Figure 4). Locally Rare.

POACEAE - GRASS FAMILY

***Aristida purpurea** Nutt. var. **purpurea** PURPLE THREE-AWNED GRASS. Perennial. Uncommon in disturbed coastal sage scrub on old road cut near east end of Buck Gully Trail. *F.M. Roberts, K. Koeslag, & N. Tamura 8657, 7 Feb 2019* (RSA).

***Avena barbata** Link SLENDER WILD OAT. Annual. Fairly common, mostly annual grassland. *F.M. Roberts 7510, 24 Apr 2012* (RSA).

***Avena fatua** L. WILD OAT. Annual. Occasional to fairly common, mostly annual grassland. *F.M. Roberts 7535, 24 Apr 2012* (RSA).

***Brachypodium distachyon** (L.) Beauv. PURPLE FALSE BROME. Annual. Fairly common to locally abundant in grassy places. *S. O'Brien s.n., 17 May 1995* (UCR), *F.M. Roberts 7509, 24 Apr 2012* (RSA).

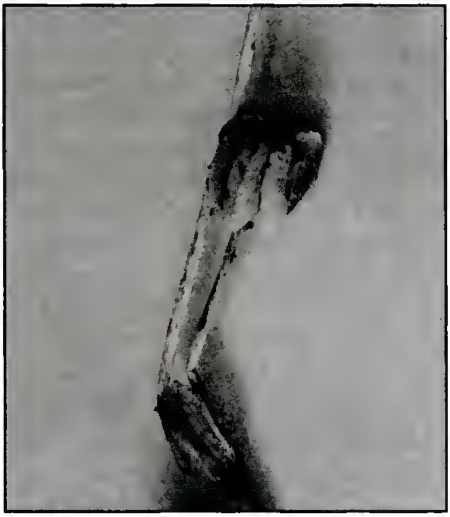

Figure 4: Photograph of *Fritillaria biflora* showing distinctive fruit form. The specimen was found by IRC biologist, Issac Osterman, in the spring of 2015 on a patch of clay soil near Buck Gully Trail south of Canyon Watch Park. Photo by Issac Osterman.

Bromus carinatus Hook. & Arn. CALIFORNIA BROME. Perennial. Occasional along Buck Gully Trail in riparian woodland and dense chaparral. *F.M. Roberts 7745* (RSA).

***Bromus catharticus** Vahl var. **catharticus** RESCUE GRASS. Annual. Occasional. *F.M. Roberts 7678, 18 Jul 2012* (RSA).

***Bromus diandrus** Roth COMMON RIPGUT GRASS. Annual. Fairly common to locally abundant in grassland. *F.M. Roberts 7494, 24 Apr 2012* (RSA).

***Bromus hordeaceus** L. SOFT CHESS. Annual. Occasional to fairly common in grassy places. *F.M. Roberts 7533, 24 Apr 2012* (RSA).

***Bromus madritensis** L. COMPACT BROME. Annual. Scattered. *F.M. Roberts 7581, 10 May 2012* (UCR).

***Bromus rubens** L. [*B. madritensis* L. subsp. *r.* (L.) Husn.] FOXTAIL CHESS or RED BROME. Annual. Common. *F.M. Roberts 7517, 24 Apr 2012* (RSA).

***Cynodon dactylon** (L.) Pers. BERMUDA GRASS. Perennial. Occasional, disturbed places. *F.M. Roberts 7731, 11 Apr 2013* (RSA).

Distichlis spicata (L.) Greene SALT GRASS. Perennial. Occasional in alkaline soils. *F.M. Roberts 7701, 6 Sep 2012* (RSA).

Ehrharta erecta Lam. PANIC VELDT GRASS. Perennial. Scattered to fairly common along drainages and adjacent to landscaping. *F.M. Roberts 7484, 5 Apr 2012* (RSA).

Elymus condensatus J. Presl GIANT WILDRYE. Perennial. Occasional in coastal sage scrub and along canyon floor. *F.M. Roberts 7628, 22 Jun 2012* (RSA).

Festuca arundinacea Schreb. TALL FESCUE. Perennial. Occasional in drainages. *F.M. Roberts 7620, 22 Jun 2012* (RSA).

Festuca myuros L. RAT-TAIL FESCUE. Annual. Occasional to fairly common. *F.M. Roberts 7736, 11 Apr 2013* (RSA).

Festuca perennis L. RYEGRASS. Annual or perennial. Scattered to fairly common in grassland. *F.M. Roberts 7534, 24 Apr 2012* (RSA).

Hordeum murinum L. subsp. ***leporinum*** (Link) Arcang. HARE BARLEY or FOXTAIL BARLEY. Annual. Scattered. *F.M. Roberts 7728, 11 Apr 2013* (RSA).

Koeleria macrantha (Ledeb.) Schult. JUNE GRASS. Perennial. Uncommon on sandy soil in open coastal sage scrub, Pelican Hill tributary. *F.M. Roberts 7757, 11 Apr 2013* (RSA).

Melica imperfecta Trin. LITTLE CALIFORNIA MELIC GRASS. Perennial. Occasional on north-facing slopes, often in coastal sage scrub or openings of toyon-sumac chaparral. *F.M. Roberts 7737, 11 Apr 2013* (RSA).

Muhlenbergia rigens (Benth.) Hitchc. CALIFORNIA DEER GRASS. Perennial Uncommon, found only in association with the restoration near Poppy Street, Lower Canyon. Undoubtedly introduced here. *F.M. Roberts 7696, 6 Sep 2012* (RSA).

Paspalum dilatatum Poir. DALLIS GRASS. Perennial. Occasional, mostly near housing. *F.M. Roberts 7697, 6 Sep 2012* (RSA).

Paspalum vaginatum Sw. SEASHORE PASPALUM. Perennial. Fairly common along water courses, lower canyon near Poppy Street. *F.M. Roberts 7652, 18 Jul 2012* (RSA).

Phalaris minor Retz. LITTLE SEED CANARY GRASS. Annual. Scarce, a single indivdual found along Buck Canyon Trail. *F.M. Roberts 7667, 18 Jul 2012* (RSA).

Poa annua L. ANNUAL BLUE GRASS. Annual. Scarce, a single individual by trail. *F.M. Roberts 7677, 18 Jul 2012* (RSA).

Polypogon viridis (Goian) Breister WATER BENTGRASS. Perennial. Occasional in moist soil along drainages. *F.M. Roberts 7621, 22 Jun 2012* (RSA).

Schismus barbatus (L.) Thell. MEDITERRANEAN SCHISMUS. Annual. Moderately common in disturbed soils. *F.M. Roberts 7524, 24 Apr 2012* (RSA).

Setaria parviflora (Poir.) Kerguelen KNOTROOT-BRISTLE GRASS. Annual. Occasional to fairly common in damp places. *F.M. Roberts 7676, 18 Jul 2012* (RSA).

Stenotaphrum secundatum (Walt.) Kuntze SAINT AUGUSTINE GRASS. Perennial. Scarce along watercourses. *F.M. Roberts 7653, 18 Jul 2012* (RSA).

Stipa lepida Hitchc. FOOTHILL NEEDLE GRASS. Perennial. Occasional in coastal sage scrub. *F.M. Roberts 7511, 24 Apr 2012* (RSA).

****Stipa miliacea*** (L.) Hoover var. ***miliacea*** SMILO GRASS. Perennial. Occasional, patchy in riparian habitat along central drainage. *F.M. Roberts, I. Osterman, & K. Koeslag 8633, 3 Oct 2018* (RSA).

Stipa pulchra Hitchc. PURPLE NEEDLE GRASS. Perennial. Overall scarce but common in localized patches. *F.M. Roberts 7732, 11 Apr 2013* (RSA).

THEMIDACEAE - BRODIAEA FAMILY

Bloomeria crocea (Torr.) Cov. var. ***crocea*** COMMON GOLDENSTAR. Perennial from corm. Uncommon. Seen only in one isolated mixed native/non-native grassland patch, Pelican Hill tributary. *F.M. Roberts 7575, 10 May 2012* (RSA).

Dichelostemma capitatum Alph. Wood subsp. ***capitatum*** BLUE DICKS or SCHOOL BELLS. Perennial from corm. Occasional in grassy places. *F.M. Roberts 7735, 11 Apr 2013* (RSA).

TYPHACEAE - CAT-TAIL FAMILY

Typha domingensis Pers. SOUTHERN CATTAIL. Perennial. Occasional along watercourses. *F.M. Roberts 7651, 18 Jul 2012* (RSA).

Book review: *A Natural History of California, second edition.* By Allan A. Schoenherr. 2017. University of California Press, Oakland, California. 618 pp.

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Allan Schoenherr has done it again! The second edition update of his 1992 *A Natural History of California* is a magnificent, engaging, and insightful portrayal of the natural world of California. The book is printed in an attractive, alkaline paper format, with lovely color images on its cover and high-quality photographs and line drawings throughout. Like the first edition, the second edition is well-organized and presented and is written in a format and narrative that are easily understood by students, professionals, and the broader public as well. Readers feel invited to continue from the first page.

Following the Acknowledgements, Preface, and Introduction, the book is arranged into 11 topical chapters (563 pages of narrative), an Epilogue, a compilation of Noteworthy Publications reflecting historic and recent literature, and an Index. There is a color section with 20 plates, including state vegetation and geology maps, a color map of the California water storage and transfer system, and 18 plates displaying dozens of stunning photographs of characteristic habitats, animals, and plants. Topics to which individual chapters are dedicated include California's Natural Regions, Basic Ecology, Basic Geology, Sierra Nevada, Mountaintops, Pacific Northwest, Coast Ranges, Cismontane Southern California, California's Deserts, The Great Central Valley, and Inland Waters and Estuaries. The California Channel Islands are well-portrayed, despite the fact that this edition does not have a Coastline chapter like the first edition. Schoenherr is in an excellent position to discuss the islands, as he wrote the seminal *Natural History of the Islands of California* (Schoenherr, Feldmeth, and Emerson, 1999). The Epilogue, subtitled "What does the Future Hold?", is an important discussion of the impact of climate change on the future of California's natural world. The Noteworthy Publications section includes the key primary literature, past and recent, for each of these habitats.

A Natural History of California is a brilliant and inspirational treatment of California's environments and is an invaluable resource for university courses. This 618-page book is a comprehensive treatment of California's natural settings and incorporates a superb anthology of references reflecting our current knowledge throughout the arena of California's habitats. Each topical section has been re-written reflecting recent literature, and the illustrations and photographs are of the highest quality. Each chapter reflects an exciting update from their presentations in the first edition. The illustrations are terrific, combining line drawings, diagrams, tables, and both black and white and color images. As an example, the figures and tables elucidating plant zonation through an elevation gradient and slope effect in the Sierra Nevada, Coast Ranges, California Deserts, The Great Valley, and Cismontane Southern California chapters are extremely useful, as are all of the regional geologic and habitat maps. His very clear descriptions and figures contrasting oligotrophic and eutrophic lakes in the Inland Water chapter are invaluable to me in my undergraduate course on Lakes, Rivers, and Streams. I use this book as a text in my large lecture classes in freshwater biology and Mediterranean ecosystems, as well as in smaller seminars. This is a book every California biologist should have on the shelf, and it truly is a treasured reference for readers of all levels. I most highly recommend it.

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NOTEWORTHY COLLECTIONS

Larrea tridentata (DC.) Coville (ZYGOPHYLLACEAE) – San Bernardino County, City of San Bernardino near Verdemont, roadside embankment of Interstate 215, 0.9 km (2,950 ft) SE of Palm Avenue and 0.1 km (328 ft) NW of Cable Creek on the San Bernardino North CA USGS 7.5 minute topographic quadrangle, unsectioned land in the Rancho Muscupiabe Grant, 34°11'08.53" N 117°21'14.58" W, elev. 500 m (1,640 ft), 15 Feb 2018, *Goforth s.n.* (RSA 865241, barcode: RSA0125217).

Previous knowledge: *Larrea tridentata* (creosote bush) is a dominant shrub over vast areas of the Sonoran Desert and Great Basin floristic provinces which encompass the transmontane region of eastern California. To the west, it becomes uncommon within the California floristic province (CA-FP), where isolated occurrences have been reported at xeric habitats of four cismontane subregions: Tehachapi Mountains area, San Joaquin Valley, South Coast, and San Jacinto Mountains (Baldwin et al. 2012). In the South Coast subregion, the Consortium of California Herbaria (CCH, 2018) database reports five previous collections. These include extant occurrences at the Rancho Santa Ana Botanic Garden in Claremont (Los Angeles County) and in Moreno Valley (Riverside County), as well as historical localities that have been eliminated at Claremont, San Bernardino (San Bernardino County), and Hemet (Riverside County), where land was cleared for agriculture and urban development. Scarcity of *L. tridentata* in xeric cismontane habitats has been attributed to fire intolerance, as higher primary productivity causes recurrent burning of the vegetation more frequently than in deserts (O'Leary and Minnich 1981, Brown and Minnich 1986). It was previously reported that *L. tridentata* does not occur in the Santa Ana River Watershed which contains the Rancho Muscupiabe Grant and City of San Bernardino (Clarke et al. 2007).

Significance: This collection is the only known extant occurrence of *L. tridentata* in the South Coast subregion of San Bernardino County. *L. tridentata* has not been reported here for 136 years since first collected in 1882 by S.B. Parish and W.F. Parish (CAS-BOT-BC 170757) at the locality of "San Bernardino", where extensive urban development subsequently occurred. Geographic coordinates recorded by CCH map this previous collection at a point on North D Street in the modern downtown of San Bernardino, with an estimated positional error of 10 km. (6.2 mi).

The nearest collections recorded by CCH are mapped at Cajon Junction (18 km NW, UCD 107198), Claremont (34 km W, RSA 811012 & POM 2697), Moreno Valley (35 km S, UCR 90004), Hemet (65 km SE, POM 49025), and Cabazon (60 km E, RSA 648310). Cajon Junction and Cabazon are at the limits of this species transmontane distribution, located in the Transverse Range subregion of the CA-FP and the Sonoran Desert region, respectively. Voucher notes for RSA 811012 taken in 2014 report this specimen was grown in the Rancho Santa Ana Botanic Garden living collection. Almost a century earlier in 1915, POM 2697 was collected from the vicinity of Claremont surrounding the modern intersection of W Bonita Ave and N Indian Hill Blvd with a mapped radius of approximately 6.3 km (3.9 mi.). Near Hemet, POM 49025 was collected in 1902 before the land was cleared, and this small native population is reported to have been eliminated (Roberts et al. 2004). At Moreno Valley, UCR 90004 was collected in 1992 from an apparently naturalized occurrence of several shrubs at the abandoned site of Camp Hahn used by the military in WWII. Roberts et al. (2004) also reported reproduction of introduced plants near Harford Springs Park on the Gavilan Plateau in western Riverside County, though no specimen is reported in the CCH database. Intervening landscapes that separate these localities have been extensively cleared by urban development and agriculture, with fragmented remnant habitat patches of disturbed old-fields, barren washes, exotic annual grassland, coastal sage scrub, chaparral shrubland, and riparian woodland lacking *L. tridentata.*

This collection was made from a solitary individual found at a steep south facing slope of 30°, about 2 m (6.5 ft) downhill from the highway guardrail of the southbound right lane, on an embankment enclosed by fence line. The shrub measured 2 m (6.5 ft) tall with a 3 m (9.8 ft) crown diameter from multiple branches with 1 cm. (0.4 in) to 2 cm. (0.8 in) stem diameters, spreading out of a single root crown. At the time of collection, it was flowering and bore fruit. The site has full sun exposure and is not irrigated. Soils at the collection site are well drained, rocky with coarse sandy loam texture, and derived from roadbed fill material. The embankment rises ca. 5 m (16.4 ft) above grade level of surrounding land, adjacent to a disturbed old-field. A mean annual precipitation of 37.7 cm (14.8 in) is recorded by the nearest rain gauge, located 2.5 km (1.5 mi) E at 470 m. (1,550 ft) elevation (San Bernardino County 2018). There is no record of disturbance by wildfire at this site since highway construction in 1958 (Cal Fire 2018, NBI 2018).

The site has been colonized by native and invasive non-native species commonly found in "Riversidian coastal sage scrub" which typically produce small, readily dispersed seed and are locally abundant in dry, disturbed habitats (after Kirkpatrick and Hutchinson 1977, Westman 1983, Davis et al. 1994, White and Padley 1997, Rundel 2007). Associated species include *Acmispon glaber* (Vogel) Brouillet, *Artemisia californica* Less., *Brassica tournefortii* Gouan, *Bromus madritensis* L. subsp. *rubens* (L.) Husn., *Centaurea melitensis* L., *Croton californicus* Muell., *Encelia farinosa* Torrey & A. Gray, *Eriogonum fasciculatum* Benth, *Erodium cicutarium* (L.) Aiton, *Helianthus annuus* L., *Hirschfeldia incana* (L.) Lagr.-Fossat, *Parkinsonia aculeata* L. (RSA 865243, barcode: RSA0125219), and *Ricinus communis* L, with no cultivated landscaping and abundant accumulation of roadside garbage. *P. acuelata* is an invasive tree that has naturalized at this site and elsewhere in Southern California, far from its native range in Arizona and Baja California where it is sympatric with *L. tridentata* in Sonoran Desert habitats (Kearney and Peebles 1960, Wiggins 1980). The highway median strip opposite from the embankment additionally includes *Nerium oleander* L., *Olea europaea* L., and *Washingtonia robusta* H. Wendl., ornamental species commonly planted in Southern California (Baldwin et al. 2012).

This collection documents reestablishment of *L. tridentata* in the South Coast subregion of San Bernardino County, and its occurrence as a roadside waif plant unlike the ruderal vegetation typically found in cismontane California (cf. Frenkel 1970). The specimen probably established by chance event of long-distance seed dispersal along the highway corridor after the embankment was constructed. It is possible that seed was dispersed to this site by animal movement, however several modes of human transport cannot be ruled out. Seed may have been introduced in the fill material that was imported to elevate the roadbed, or by a Caltrans mower or other equipment used to subsequently maintain the embankment, or from vehicular travel on this highway in a southbound direction to San Bernardino from the Cajon Pass. Events of long-distance plant migration are seldom observed and may expand the species range if a new outlying population establishes (Sauer 1988). The growing sympatric population of *P. acuelata* indicates there is potential for *L. tridentata* to naturalize at this site. On the other hand, colonization may fail in the absence of reproduction, particularly if the site were to be burned or cleared of vegetation. Thus, change in the species range ultimately depends on a dynamic outcome between the expansionary movement achieved by seed dispersal and constraining effects encountered during the longer-term process of habitat colonization (Sauer 1988). More broadly, this collection provides evidence that jump-dispersal seed movement is associated with the disjunctive distribution of *L. tridentata* in cismontane landscapes of the CA-FP, as previously suggested for "out-of-range" occurrences reported in the San Joaquin Valley (Twisselman 1956, Twisselmann 1967).

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Zeuxine strateumatica (L.) Schlechter (Orchidaceae) – Riverside County. *Rick McNeill 20170304-01, 4 Mar 2017* (RSA); *Duncan S. Bell & LeRoy Gross 10,314, 16 Mar 2017* (RSA). San Bernardino Mountains; Whitewater Canyon; the Wildlands Conservancy's Whitewater Preserve, approximately 0.4 air mi SSE of the Whitewater Ranger Station or Visitor Center. Collection made at 33.98332, -116.65503 (NAD83) 2,120 ft. Locally common, (more than 50 individuals noted), in scattered colonies, in dense *Salix* thicket at margin of canyon. Growing in moist and muddy pockets of soil and gravel, among large rocks in small braided flowing streamlets. All plants had flowers and some had fruits at the time of collection. Growing with *Eleocharis parishii* Britton, *Juncus rugulosus* Engelm., *Oenothera elata* Kunth, *Populus fremontii* S. Watson, *Salix exigua* Nutt., *Salix laevigata* Bebb, *Typha* L.

Previous knowledge: *Zeuxine strateumatica,* commonly known as lawn orchid or soldier orchid, is native to Asia where it is found in China, Japan, Uzbekistan, Iran, Afghanistan and Southeast Asia. It is non-native in the United States and was first thought to be introduced into the United States in 1927, when it arrived in Florida via a shipping container from China that was holding centipede grass (*Eremochioa ophiuroides* (Munro) Hack.; American Orchid Society, 2017). It is currently known to occur in the states of California, Florida, Georgia, Alabama, Louisiana, Texas, and Hawaii (USDA 2018). We were able to verify a single occurrence in California, based on a search of the Consortium of California Herbaria (CCH 2018), where it was documented in San Francisco in 1995. This occurrence was noted as being a "weed growing from coconut husk used as planting medium", and the collection was made at an orchid nursery. Thus, it appears that *Zeuxine strateumatica* had not been documented as naturalizing in California prior to 2017.

Significance: The collections cited above are not only the first documented wild collection of *Zeuxine strateumatica* in California, but also for the entire Western United States. It is currently unknown how this non-native orchid naturalized in California, or when it was introduced. Whitewater Canyon has been well-documented by botanists for over a century, and it is hard to believe that this orchid went unnoticed and was not documented at an earlier date. It should be noted in the spring of 2017, when *Zeuxine strateumatica* was first recorded in Whitewater Canyon, the river was running unusually high and inundated the thicket of *Salix* where this species was found (personal observation). Prior to being managed as a Preserve, much of this area was a private ranch that was known to have a number of exotic species that were brought in by the land owner. It is possible that *Zeuxine strateumatica* could have been intentionally or accidentally introduced into the area during the private ranching era, but perhaps laid mostly dormant except in years of exceptional precipitation such as 2017, when the river flow was higher than usual. On 16 Mar 2017 Duncan Bell and LeRoy Gross visited several other locations downstream that were nearly identical in habitat, and *Zeuxine strateumatica* was not found. It is currently unknown how widespread this orchid is in the Whitewater Canyon area. Additional surveys should be performed to see how widespread *Zeuxine strateumatica* is in Whitewater Canyon and whether or not it is a potential threat to native species in this area.

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